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Reports above mentioned, as well as upon several papers for the publications of the Carnegie Museum.

It is a pathetic coincidence that the words which Dr. Dall applied in this journal to the late Professor Beecher should so soon find an exact application to Beecher's former colleague in the Yale Museum: 'The ranks of those capable of bringing to the study of fossils keen insight and a philosophical spirit of inquiry, guided by principles whose value can hardly be exaggerated, are diminished by one whom science could ill afford to lose, and to whom, humanly speaking, there should have remained many years of industry and fruitful research.'

W. B. SCOTT.

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#### SCIENTIFIC BOOKS.

*Adolescence; its Psychology and its Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion and Education.* By G. STANLEY HALL. New York, D. Appleton and Company. 1904.

The range of President Hall's two volumes is even wider than the title announces. Besides the topics there indicated, the book contains an outline of the author's general psychological system, a philosophical *credo*, and multitudinous comments on the psychology of early childhood and adult life. The thirteen hundred and more pages are somewhat evenly divided among physical, psychological, social and miscellaneous phenomena. The author's division is as follows:

*Volume I.*—Growth in height and weight, 50 pages; growth of parts and organs during adolescence, 78 pages; growth of motor power and function, 108 pages; diseases of body and mind, 88 pages; juvenile faults, immoralities and crimes, 86 pages; sexual development: its dangers and hygiene in boys, 61 pages; periodicity, 41 pages; adolescence in literature, biography and history, 77 pages.

*Volume II.*—Changes in the senses and the voice, 39 pages; evolution of the feelings and instincts characteristic of normal adolescence, 55 pages; adolescent love, 49 pages; adolescent

feelings toward nature and a new education in science, 88 pages; savage public initiations, classical ideals and customs and church confirmation, 49 pages; the adolescent psychology of conversion, 82 pages; social instincts and institutions, 86 pages; intellectual development and education, 112 pages; adolescent girls and their education, 87 pages; ethnic psychology and pedagogy, or adolescent races and their treatment, 101 pages.

The student will naturally divide the book as a whole into: (1) An array of facts bearing upon its topics, (2) an attempt to establish a parallelism between the mental development of human individuals and that of the whole phylum at one extreme of which they stand and (3) the author's educational recommendations. The reviewer will follow this division.

The array of facts presented implies an astonishing labor in reading, selecting and condensing. Over two thousand writers are quoted or referred to. Whoever has made any pretense of saying a scientific word about the rich life of concrete human nature, we may expect to find summarized. Be it the love of children for cats or growth of thoracic capacity or the lives of the saints, President Hall is equally ready with varied comment and plenteous references. No one person could estimate the completeness, accuracy and relevancy of this body of information as a whole. If the citations and summaries under each topic do represent adequately the views of the experts, President Hall's tremendous zeal will result in a corresponding saving of time and gain in insight for future students. If they do not, very many will be misled. In any case the array of information will, in these volumes as in the author's teaching, stimulate and suggest. In those fields where the reviewer could presume to judge, there appears an unhappy tendency toward the selection of authors and extracts which fit President Hall's own prepossessions. And this suspicion is too frequently confirmed in cases where expertness is not requisite. We tend to lose confidence in no matter how eminent a scholar, when, in a description of 'Adolescence in Literature and Biography,' he gives a thousand words to a summary of Mary Mc-

Lane and not one to the masterly descriptions of youth by George Meredith; or when he brushes aside James's 'Varieties of Religious Experience' as the work of a 'brilliant litterateur' who 'lays on colors with a trowel' and 'throws scientific caution to the winds.'

It was to be expected that the author would use, at their face value, the replies to printed questions written by children and normal school students and those interested enough to reply. Although he is probably the only one of the score of most eminent psychologists who put any trust in such replies, President Hall's confidence is serene and he does not even deign to justify his choice of a method so universally rejected by his peers.

The second chief aim of the book, to show how human life in general and adolescent mind in particular demand a comparative and genetic psychology as their explanation, is fulfilled to the extent of demonstrating and richly illustrating the fact that human nature in mind as in body bears traces of its long savage and animal ancestry. Although the author is, perhaps, brutal in his reproaches against the mere analysis of mental states, he is surely right in asserting the need of a true natural history of mind and in seeking to base theories of human behavior upon a dynamic rather than a static psychology. So much is irrespective of the particular connection which he believes to exist between human mental life as we know it to-day and the mental history of the long line of our ancestors; namely, the recapitulation by the individual of his phylum's evolution. It is impossible for the reviewer to discover just what the recapitulation theory means to President Hall. At times he seems to agree with the thorough-going parallelism stated by G. H. Schneider a score of years ago; at times the logical outcome of his concrete illustrations can be hardly more than a general continuity between human and animal instincts and capacities. In general he may fairly be said to explain any similarities between present and ancestral conditions by a recapitulatory tendency rather than by similarity in conditions and to seek constantly for such similarities. Many of his explanations are so purely specu-

lative as to weaken his argument. One is amused more than edified by reading that the 'candle-light fever,' the excitement of children before bed-time, may be 'the reverberation in modern souls of the joy that in some prehistoric times hailed the Prometheus art of controlling fire and defying night.' And what can he mean by offering as evidence of mental recapitulation of a piscine stage the fact that the whales and others have changed from terrestrial to marine life (see Vol. II, p. 195)? And does not the argument become a trifle intricate when the fear of water and the love of water and the sitting 'by the hour seeing and hearing the movements of water in sea and stream' all prove recapitulation?

President Hall's educational recommendations will be read by many who will skip his summaries of facts and misunderstand such of his psychological speculations as they do not forget. They are the most personal and heartfelt portions of the book, with the exception of the eulogy of adolescent love, and will refresh many a student wearied by modern pedagogy. His fundamental principles are sufficiently startling. The tendency of evolution, in other words, the probable future, should be the goal of human effort. Morality is simply being up to and ahead of the times. The survival of a race proves the moral fitness of the individuals composing it; therefore, educate people to survive and propagate. You thus improve them. Delay the age of nubility, because the germs inherit the acquisitions of the individual, nay more, inherit the natures of previous ancestors only as the individual reacquires them. The latest stage in evolution is your goal, but omit no one of the earlier stages, for each is a *sine qua non* for the next. To be rid of a trait in later life cultivate it for a time in youth. But if you don't dare to let children be cruel and quarrelsome, at least let them contemplate these traits in literary or dramatic presentations.

In concrete recommendations the influence of this amazing creed is outweighed by that of President Hall's great practical wisdom and sharpest insight into the follies of our present traditionalism. The readers of this journal deserve, in the case of his comments on sci-

ence in the schools, a more detailed review than has been possible of the book as a whole. "Science should be taught first in a large, all-comprehensive way, not without a distinctly religious spirit." In childhood and youth we should encourage the 'sentimental response' to nature. Then should come popular science with many object lessons and stories of the heroes of science. Then the applications of science; 'the practical technological side of science should precede its purer forms.' 'Last and highest comes pure science.' For example, in physics teach boys and girls much about the heroes of science and the drama of research, diminish quantitative work, be more superficial for the sake of harmony with the recapitulation theory, make large use of mechanical toys, photography and the like. Let astronomy declare the glory of God rather than of precise measurements. Let biology emphasize life activities and the general theory of evolution. In general President Hall's destructive criticism of present high school text books of science, in which the man of science seems to postulate that what he happens to know and be interested in is what school-boys should learn, is stronger and will be more profitable than his positive suggestion that we revert to the personification of animals, ecstasies over nature and the goodness of God, and superficial cosmologies. The superficial cosmology has, perhaps, more in its favor than the present generation of men of science will admit. But it seems to entail rote memorizing as a method of study.

Two general features of the volumes, one of content and one of style, it is the reviewer's duty to note. The acts and feelings, normal and morbid, resulting from sex are discussed in a way without precedent in English science. To realize the material presented one must combine his memories of medical text-books, erotic poetry and inspirational preaching. Witness the following: "Every gemmule is mobilized and the sacred hour of heredity normally comes when adolescence is complete in wedlock and the cerebro-spinal rings up the sympathetic system, and this hands over the reins to the biophores and germ cells, which now assert their dominance over those

of the soma. In the most unitary of all acts, which is the epitome and pleroma of life, we have the most intense of all affirmations of the will to live and realize that the only true God is love, and the center of life is worship. Every part of mind and body participates in a true pangenesis. This sacrament is the annunciation hour which the whole world reflects. Communion is fusion and beatitude. It is the supreme hedonic narcosis, a holy intoxication, the chief ecstasy, because the most intense of experiences; it is the very heart of psychology, and because it is the supreme pleasure of life it is the eternal basis and guarantee of optimism. \* \* \*

"Reproduction is always sacrificial. Man learns to live by dying and his life is at best a masterly retreat. Relaxation and detumescence are the first faint symptoms from afar of senile involution and the Nemesis of death, toward which the individual shrivels. After the high tide in which the *ars amandi* culminates, lifting existence, like the great bore on the Chinese rivers, the law of *post coitum triste* is gradually accentuated with increasing years. Now man truly knows good and evil, euphoria and disphoria, and is polarized to pleasure and pain."

The feature of style is a baffling junction within the same paragraph, or even sentence, of statements which to the commonplace mind have no logical connection. The extraordinary range and vivacity of the author's interests are probably the cause. But some sacrifice should have been made to the commonplace thinker who will puzzle long and, perhaps, in vain to see the unity or logic of the hundreds of passages like the following: "The chief reason why our Bible is the best of all ethnic Bibles is because it is so deeply based upon genetic truth. The story of creation is full of ancient and subtle symbols of divine generation. The tale of Eden and the fall, whatever historic validity it may or may not have, is a masterly allegory of the first stage in the decadence of love. Abraham, a nomad sheik, was a breeder of cattle, and the promise was that he should be a breeder of men like the stars of the heavens for multitude. Circumcision was a hygienic measure of great

efficacy, as we shall see, as well as a covenant. The long wars with the Canaanites and Baal worshippers were conflicts with phallicism, to the gross orgies of which the chosen people were always lapsing. All early Hebrew history shows that while man knows how to breed cattle, Jehovah could breed men, and it is a study of human heredity far more effective than Plato knew how to make it. The New Testament begins with the annunciation and conception from on high, and a nursery scene of moving bucolic power, while Islam hypostatizes only the former." And what strength is added to a eulogy of wrestling by the last clause of this sentence: "The very closeness of body to body, emphasizing flexor rather than extensor arm muscles, imparts to it a peculiar tone, gives it a vast variety of possible activities, developing many alternatives at every stage, and tempts to many undiscovered forms of mayhem." These two samples were taken practically at random, but one puzzling association so rings in the reviewer's ears that he must allow it a motor discharge. It concerns the psychology of prison life and is, "Not only men, but women fall\* in a school-girl mash, but women can not organize or complot." EDWARD L. THORNDIKE.

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#### SCIENTIFIC JOURNALS AND ARTICLES.

THE leading article in the *Journal of Comparative Neurology and Psychology* for June is 'An Enumeration of the Medullated Nerve Fibers in the Ventral Roots of the Spinal Nerves of Man,' by Charles E. Ingbert, a direct continuation of the same author's former enumeration of the dorsal root fibers of man. An extensive discussion of the areas of the cross-sections of each root, the number of fibers per square millimeter of the cross-sections and the relation between the dorsal and ventral roots is followed by figures and tabulations giving the data for each fascicle of each nerve root. There are 203,700 medullated nerve fibers in the ventral roots of the left side

\* The actual text is *pall*, which to the reviewer makes a truer statement, but the context suggests the correction.

and 653,627 in the dorsal roots, these numbers being in the ratio of 1:3.2. In the white rat this ratio is 1:2.3 and in the frog 1:1.2, indicating that probably the relative sensory supply increases as we ascend in the zoological series.

#### SOCIETIES AND ACADEMIES.

##### THE TORREY BOTANICAL CLUB.

THE meeting of May 10, 1904, was held in the library of the New York College of Pharmacy, Rev. L. H. Lighthipe presiding.

The first paper on the scientific program was by Dr. H. M. Richards, entitled, 'Notes on the Peat Bogs of Ireland.' The peat bogs have been variously estimated as covering from one fifth to one tenth of the surface of Ireland; probably the larger estimate is excessive.

Dr. Richard's observations at several points on the west coast including Donegal and Achill Island were given. The basis of the bogs is not always the same, but in some cases it is glacial gravel. The thickness of the peat varies from one or two feet to forty feet, but no exposures of more than twenty-five feet thickness were seen. On the slopes and hill-sides the peat is thinner, but becomes accumulated in the lower situations so that the thickness of the bog does not necessarily show its age. Bogs have been known to burst, as in Sligo, in 1831, and to do considerable damage to houses below them.

The peat is mostly vegetable matter and yields very little ash. According to Lyell, its formation is supposed to be due to the low temperature preventing complete decomposition of the vegetable matter. Peat is not formed in warm countries and the additions to the beds are made in cold weather. In the bogs seen there was standing water only in the holes and ditches, but the soil was wet and soggy. Comparatively little of the bog oak is found. Some of the stumps are in place, showing that they are not driftwood carried into the bog. The dark color and hardness of the bog oak are said to be due to the action of a diatom, a *Melosira*, and the formation of bog iron ore is supposed to be due to the same